U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF OCEANOGRAPHY AND MARINE ASSESSMENT
OCEAN ASSESSMENTS DIVISION
Hazardous Material Response Branch
7600 Sand Point Way N.E. - Bin C15700
Seattle, Washington 98115

May 11, 1989

Roy / Janet
SCP Carlstadt comments

SDMS Document
68055

Norman Vogelsang
U.S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10278

Dear Mr. Vogelsang:

Enclosed please find NOAA's Preliminary Natural Resource Survey (PNRS) for the Scientific Chemical Processing site (Site ID 65) in Carlstadt, New Jersey and the GM Foundry site (Site ID: A46 in Massena, New York.

NOAA has provided information in this report concerning its position relative to a covenant not to sue for natural resource damages. This position is based on information available at the time of the survey. NOAA's position may change depending on the availability of new information.

Information on NOAA's position concerning potential natural resource damages shall remain confidential. This information is clearly marked and is contained in the section named, "SUMMARY REPORT." The summary report shall be protected under the principles of deliberative process, attorney-client, and work product. The Department of Justice or NOAA will represent NOAA's position in negotiations with responsible parties. Information contained in the section named, "FINDINGS OF FACT" is considered part of the public record.

I look forward to our continuing cooperation on Superfund site investigations.

Sincerely,

Robert Pavia

cc: Vincent Pitruzzello
Mel Hauptman
George Paulou
John Lindsay

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION PRELIMINARY NATURAL RESOURCE SURVEY

Scientific Chemical Processing, Inc. (SCP)

Carlstadt, New Jersey
NJD070565403 Site ID: 65
May 11, 1989

FINDINGS OF FACT

SITE EXPOSURE POTENTIAL

Site History

The Scientific Chemical Processing (SCP) site is a former waste processing facility in Carlstadt, New Jersey (Figure 1) (Dames and Moore 1988). From 1941 to its closure in 1980, the facility accepted various wastes for recovery or disposal. The facility was originally used for solvent refining and solvent recovery. SCP leased the land from 1970 to 1980, using the facility for recycling industrial wastes until 1980 when it was shut down by a state court order (Reger 1983). While in operation, SCP received liquid by-product streams from chemical and other industrial firms, and then processed the wastes to reclaim marketable products (e.g., methanol), which was then sold back to the originating company. In addition, other liquid hydrocarbons were processed, blended with fuel oil, and either sold back to the originating company or to cement and aggregate kilns as fuel. Other materials known to be on-site included paint sludges and acids. There were no permitted discharge systems into either Peach Island Creek or Berrys Creek from the SCP site (Fieldstein, personal communication 1989).

In 1979 the New Jersey Department of Environmental Protection (NJDEP) conducted an on-site study. Contamination had resulted from leaky storage tanks, lack of containment provisions, and inadequate maintenance. In addition, a petroleum leachate was observed discharging from the banks of Peach Island Creek and a municipal sewer system. When the site was closed in 1980, over 300,000 gallons of waste and recyclable materials were being stored on the property (Dames and Moore 1988). These wastes materials were removed upon closure of the facility. The site is presently vacant, except for two small buildings, several concrete slabs, and piles of construction rubble. A steel container with contaminated sludge containing 3% PCBs, 5% lead, 1.2% chromium, and other metals still remains at the site (Ludwig, personal communication 1989). Analytical results indicate that much of the site is contaminated with organic chemicals, including PCBs, and trace elements.

Two other NPL sites are located in the Berrys Creek watershed. The Berrys Creek/Woodridge site, also known as the Ventron/Velsicol site, is located on Berrys Creek approximately one kilometer upstream of the confluence of Peach Island Creek and Berrys Creek. This site is believed to be a major source of mercury to Berrys Creek. Universal Oil Products, another NPL site, is located on a tributary of Berrys Creek (Ackerman's Creek) and is known to be a source of PCB contamination. Along with the two NPL sites in this watershed, numerous other industrial sites are located along Berrys Creek.

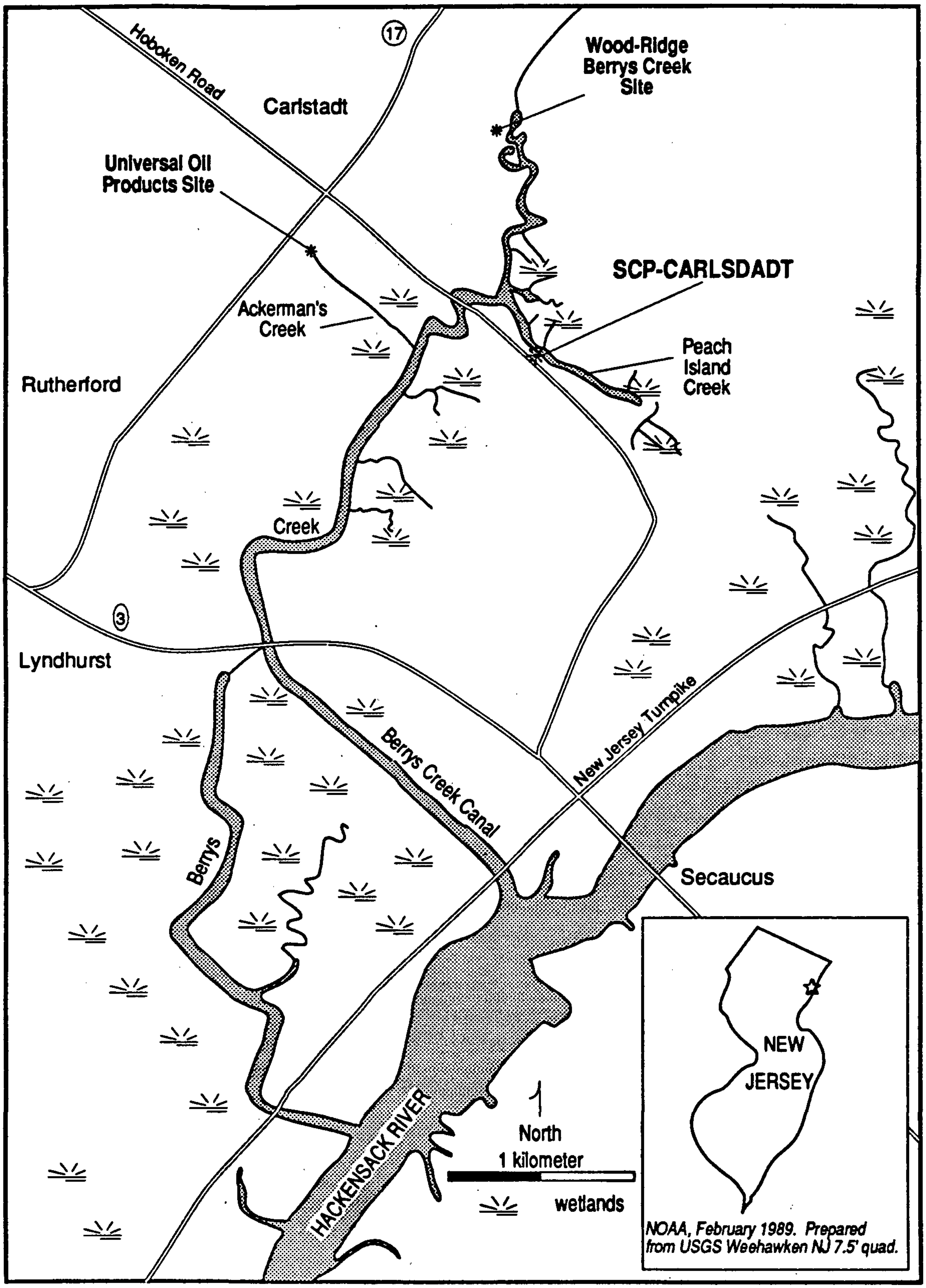

Figure 1. The SCP-Carlstadt study area in Carlstadt, New Jersey.

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Physical Description

The inactive Scientific Chemical Processing (SCP) site is located in the town of Carlstadt, Bergen County, New Jersey (Dames and Moore 1988). This area is within the Hackensack Meadows, an extensive area of salt water marshes that are drained by the Hackensack River and its tributaries. The site is on 2.4 hectares of relatively flat and sparsely-vegetated land composed of fill material. The site is fenced on three sides (east, west, and south), and is bordered by roadways on the south and west, with Peach Island Creek on the north and an industrial facility on the east. The site had four operational areas including a tank farm, drum storage areas, still and boiler house, a staging platform and thin-film evaporator, along with a sludge disposal area (Figure 2). Crushed drums were noted to be scattered throughout the site.

Surface waters of interest include Peach Island Creek, which is a low-gradient tidal creek flowing along the northern perimeter of the site (Dames and Moore 1988). A small embankment cuts across Peach Island Creek just downstream of the SCP site, with four culverts in the embankment to permit water to flow between the upper and lower reaches of the stream. There is a large deposit of organic material on the upstream side of the embankment. The SCP site is within the 100 year flood plain of the creek. Peach Island Creek flows for 0.7 km before discharging into Berrys Creek. From the confluence with Peach Island Creek, Berrys Creek flows southwest for approximately 2.5 km where the creek branches into Berrys Canal. The majority of the stream flows down the canal, with only a small connection remaining with the lower natural stream bed. The creek and canal flow for four and two kilometers, respectively, into the Hackensack River. The Hackensack River flows into Newark Bay, approximately 10 km below the mouth of Berrys Creek. All of the surface waters in the vicinity of the site are tidally influenced.

The major pathways for contaminants to reach NOAA resources include groundwater flow and surface water runoff. Groundwater at this site consists of three aquifers, a shallow water table aquifer, an intermediate semi-confined aquifer (glacial till aquifer), and a bedrock aquifer. The water table aquifer ranges from 0.3 to 0.6 meters deep and is perched on an underlying clay layer (Dames and Moore 1988). The intermediate aquifer consists of a glacial till stratum between the clay and bedrock. Groundwater on the site flows radially away from the site toward Peach Island Creek and the surrounding road, with this flow pattern likely due to a series of backfilled subterranean ditches.

Surface water runoff from the site to Peach Island Creek is not controlled by a site collection system, although some of the storage areas have dikes or ditches around them. There are no permitted discharges from the site to the creek.

CHEMICAL HAZARDS

Contaminants and Concentrations

Remedial Investigation activities included the collection of 37 on-site soil samples, 17 on-site shallow water table aquifer samples, three on-site intermediate glacial till aquifer samples, and 16 surface water and 8 sediment samples from Peach Island Creek. Peach Island Creek stations were approximately 30 m upstream of the site, adjacent to the site, 30 m downstream of the site, and at the mouth of Peach Island Creek. Sediment samples were split into upper 15 cm (6 in) samples and 15-30 cm samples. Results showed a wide variety of organic and inorganic contaminants in all environmental media sampled (on-site

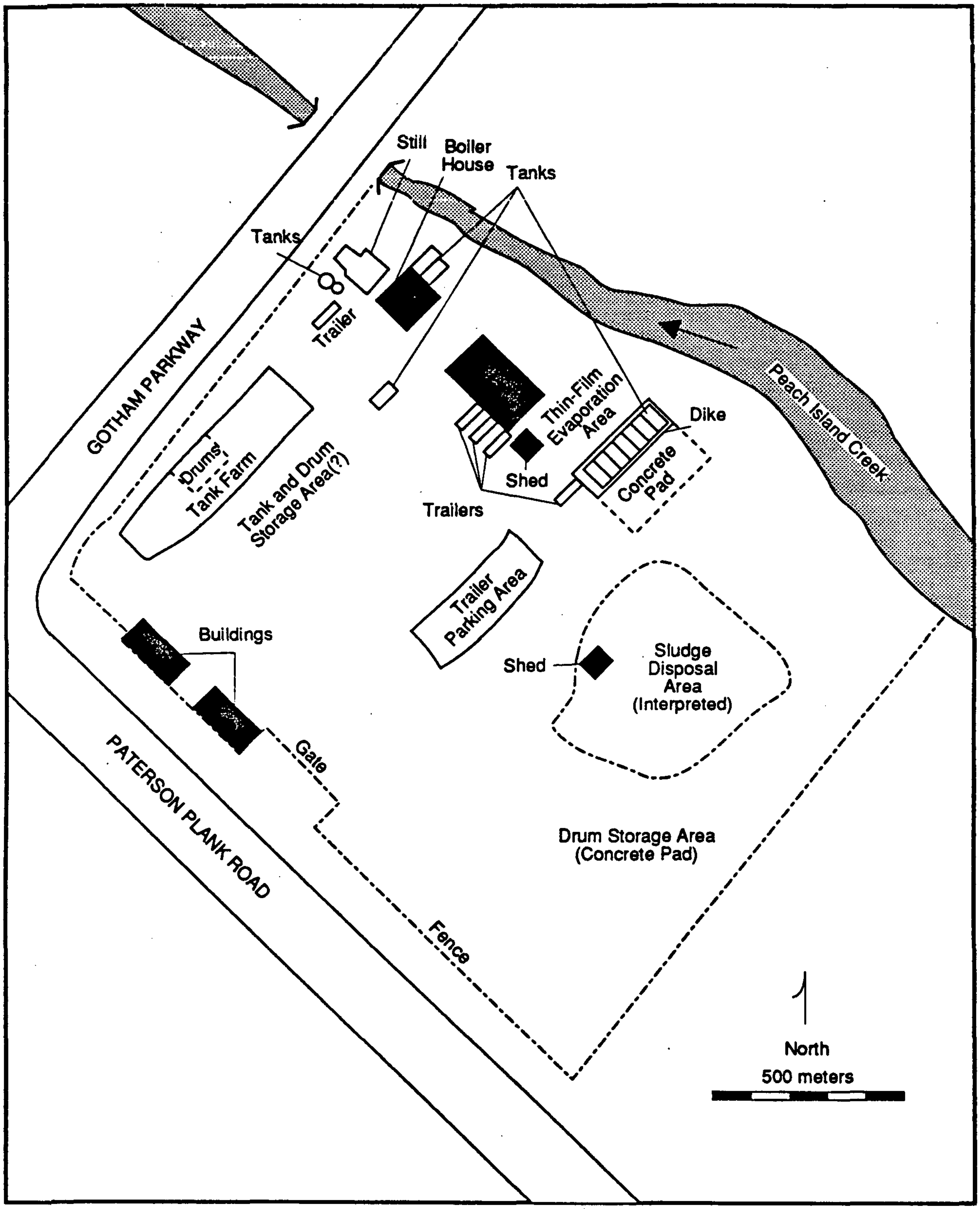

Figure 2. The SCP-Carlstadt site in Carlstadt, New Jersey (prepared from Dames & Moore 1988).

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soil, on-site groundwater, and Peach Island Creek surface water and sediment) (Dames and Moore 1988).

No criteria are presently available to evaluate the hazard of sediment contaminant concentrations that are comparable to the ambient water quality criteria. Two approaches currently under consideration by the EPA Science Advisory Board are the Apparent Effect Threshold (AET) and the Equilibrium Partitioning (EP) approaches. The AET approach, which was developed in Puget Sound (Washington), uses field data (chemical concentrations in sediment) and at least one biological indicator of injury (sediment bioassays, altered benthic infauna abundance) to determine the concentration of a given contaminant above which statistically significant biological effects would be expected (PTI 1988). Although AET values have only been derived for Puget Sound and there are limitations in applying those values to other areas, they can provide some guidance in identifying contaminant concentrations of concern. The EP approach is based on partitioning theory and applies primarily to nonpolar organic contaminants; however, no values are available at this time.

PCBs/Pesticides

PCBs are very persistent compounds in the aquatic environment (Clement 1985). Once adsorbed to soil or sediment, PCBs may remain for years, with slow desorption providing continuous, low-level exposure to the surrounding environment. PCBs were detected in on-site soil and sludge, with the highest level recorded (15,000 mg/kg) from near the Sludge Disposal area (Table 1).

The maximum PCB concentration reported from the shallow aquifer (17,000 µg/l) on-site exceeded EPA acute ambient water quality criteria by over 3 orders of magnitude (Table 2) and is much greater than levels known to be acutely toxic to grass shrimp (12.5 µg/l) or Eastern oyster (10.2 µg/l) (Eisler 1986). This concentration is much higher than the solubility of PCBs in water, but the presence of volatile organic compounds (VOCs) in the water may have increased the solubility (Dames and Moore 1988). The maximum concentration in the intermediate glacial till aquifer (1.8 µg/l) exceeded EPA chronic ambient water quality criteria by more than one order of magnitude.

PCBs were also detected in stream sediment from Peach Island Creek, with the maximum levels found adjacent to the site in both the upper 15 cm samples (55 mg/kg) and the 15-30 cm samples (770 mg/kg). Maximum PCB concentrations in creek sediment from all stations (Dames and Moore 1988) exceeded their AET values by at least an order of magnitude (Table 1). Similar concentrations in marine sediments of Puget Sound, Washington were associated with significant biological effects in bioassays (amphipod, oyster larvae and Microtox) and in the abundance of benthic macroinvertebrates.

The pesticides DDT and endrin were detected in the shallow aquifer at maximum concentrations of 1.8 and 15 µg/l, respectively. Both of these concentration levels exceed the EPA ambient water quality criteria for the protection of marine life (EPA 1986). Acute toxicity has been reported in Atlantic silverside and striped bass at 0.4 and 0.53 µg/l, respectively for DDT, and 0.005 and 0.094 µg/l, respectively for endrin (EPA 1980a,b). Low concentrations of DDT (1.0 µg/l) and endrin (0.3 µg/l) were also found to be acutely toxic to Killifish species (*Fundulus* sp.). Pesticides were not detected in any other media.

Trace Elements

Trace elements are persistent environmental contaminants that tend to sorb to particulates and sediments, are toxic at relatively low concentrations and can bioaccumulate in aquatic organisms (Clement 1985). Six trace elements were found in on-site soil samples that exceeded background levels in natural soils (EPA 1983) (Table 1). Of these elements, cadmium, copper, and zinc had levels that were up to three orders of magnitude above background levels in U.S. soils (EPA 1983).

Nine trace elements were detected in Peach Island Creek sediment at elevated concentrations, and seven of these exceeded their AET values. Mercury levels were over an order of magnitude above AET values at all stations. No clear patterns in trace element concentrations were observed in the stream sediment stations. Mercury concentrations, for example, were highest downstream of the site at the mouth of Peach Island Creek, while copper was highest upstream of the site.

Eight inorganic substances were detected in shallow aquifer samples at levels that exceeded the EPA ambient water quality criteria for the protection of marine life (AWQC) (Table 2). Total cyanide, at 3,640 µg/l, was over 3 orders of magnitude above the AWQC for cyanide. (According to EPA (1986), the AWQC for cyanide may be overly protective, since they are based on "acid soluble" cyanide. Until EPA-approved methods are available for measuring acid soluble cyanide, however, total cyanide is the recommended measurement).

In Peach Island Creek surface water samples, all five trace elements detected had their highest concentrations at the upstream station. Mercury and copper exceeded AWQC by at least one order of magnitude.

All the inorganic substances detected in groundwater and/or the surface water of Peach Island Creek are known to be toxic to aquatic life. Copper is acutely toxic to striped bass at 50 µg/l (EPA 1984a), and mercury is acutely toxic to mysid shrimp and American oyster at 1.8 and 3.3 µg/l, respectively (EPA 1980c). Zinc is toxic to the American oyster at 310 µg/l (EPA 1980d) with silver acutely toxic at 5.8 µg/l (EPA 1980e). Several epibenthic crustaceans have shown acute toxicity to cyanides between 30 and 124 µg/l (EPA 1980f). Concentrations of arsenic, chromium and nickel observed in surface and groundwater were up to an order of magnitude above levels reported to be toxic to euryhaline and marine organisms (EPA 1980g,h; EPA 1984a).

Migration of trace elements into Peach Island Creek appears to be from groundwater sources (Dames and Moore 1988), although surface water runoff is another possible pathway to NOAA trust resources. No data is available on surface runoff from the site.

Volatile Organic Compounds (VOCs)

VOCs are not very persistent in aquatic systems (Clement 1985). Most VOCs are toxic only at high concentrations (>1,000 µg/l), but sensitive species may show toxic responses at lower levels. The migration of VOCs through environmental media generally result in considerable attenuation through dilution and volatilization, but the close proximity of VOC sources to NOAA trust habitats make these substances a concern at this site.

Table 1. Maximum concentrations (mg/kg) of major contaminants (Dames and Moore 1988) found in soil or sludge on-site compared to U.S. background concentrations (EPA 1983) and stream sediment compared to Apparent Effects Threshold (AET) values (PTI 1988).

Contaminant	On-Site Soil/Sludge	U.S. Background[1]	Peach Island Creek Sediment[2] Mouth	Downstream	Adjacent	Upstream	AET[3]
PCBs							
Total PCBs	15,083	NA					
Upper (0-15 cm)			24.2*	41**	55**	31**	0.13-3.1
Lower (15-30 cm)			42**	109**	770**	11.6*	
Trace elements							
Arsenic	62*	1-50	34	ND	ND	37	57-700
Cadmium	132**	0.01-0.7	32*	12*	43.4*	84*	5.1-9.6
Chromium	870	1-1000	1,060*	156	345*	819*	260-270
Copper	71,600**	1-40	861*	1,240*	2,000*	9,510*	390-1300
Lead	2,810**	2-200	360	340	520*	320	450-660
Mercury	21**	0.01-0.3	139**	13*	25.4**	41**	0.4-2.1
Nickel	116	5-5000	100	96	110	467	NA
Silver	40*	0.01-5	8.6*	ND	2.7	2.4	6.1
Zinc	44,400**	10-300	2,880*	411	2,320*	3,110**	410-1600
Volatiles							
Chlorobenzene	336	NA	0.2	17.1	ND	4.0	NA
Choroform	379	NA	ND	3.7	ND	3.8	NA
Ethylbenzene	652	NA	0.03	35.1**	439**	7.4**	0.01-0.05
Methylethyl ketone	795	NA	0.06	18.3	ND	31.9	NA
Methylene chloride	124	NA	0.04	ND	ND	3.7	NA
Tetrachloroethylene	4,290	NA	ND	ND	953**	ND	0.06-0.21
Toluene	3,380	NA	ND	322	2,970	74.5	NA
1,2-trans-dichloroethylene	512	NA	ND	ND	ND	1.6	NA
1,1,1-trichloroethane	1,770	NA	ND	ND	222	ND	NA
Trichloroethylene	2,060	NA	ND	ND	9,950	1.9	NA
Xylene	3,450	NA	0.1	148**	1,707**	33**	0.04-0.16
Semi-volatiles							
Anthracene	86	NA	ND	0.3	ND	ND	0.9-13
Benzo (a) anthracene	84	NA	ND	0.9	ND	ND	1.3-5.1
Benzo (a) pyrene	108	NA	ND	0.8	ND	ND	1.6-3.6
Benzo (b) fluoranthene	164	NA	ND	1.5	ND	ND	3.6-9.9
Bis (2-ethyl hexyl) phthalate	281	NA	2.9*	356**	240**	108**	1.3-3.1
Butyl benzyl phthalate	861	NA	ND	0.8	9.7**	ND	0.06-0.9
Naphthalene	480	NA	ND	1.5	20.3*	1.3	2.1-2.7
Total phenols	683	NA	36	16	315	94	NA
Other							
Petroleum hydrocarbons	81,600	NA	8,980	5960	20,200	25,900	NA

[1]Background concentrations in regional soils of the United States (EPA 1983)
[2]All sediment samples from upper 0-15 cm except for PCBs
[3]AET values represent significant biological effects in four biological indicators: abundance of major taxonmic groups of benthic macroinvertebrates, amphipod mortality bioassay, oyster larvae mortality bioassay and Microtox bioassay
NA Data not available
ND Not detected
* Elevated above highest background level in soil and lowest AET value in sediment
** Elevated ≥10 times above highest background in soil and highest AET value in sediment

Table 2. Maximum concentrations (µg/l) of the major contaminants observed in the groundwater and surface water (Dames and Moore 1988) compared to EPA ambient water quality criteria (AWQC) for the protection of marine life (EPA 1986).

	Groundwater		Surface Water			AWQC	
	Shallow	Intermediate	Peach Island Creek				
Contaminant	Aquifer	Aquifer	Downstream[1]	Site	Upstream	Acute	Chronic
PCBs/Pesticides							
Total PCBs	17,000**	1.8**	ND	ND	ND	10	0.03
DDT	1.7**	ND	ND	ND	ND	0.13	0.001
Endrin	15**	ND	ND	ND	ND	0.04	0.002
Trace elements							
Arsenic	1,600**	ND	ND	ND	ND	69	36
Chromium	420*	ND	28	ND	56*	1,100	50
Copper	60**	19*	27*	29*	100**	2.9	2.9
Mercury	0.2**	ND	2.1**	1.0**	4.8**	2.1	0.025
Nickel	150**	ND	31*	33*	57*	75	8.3
Silver	110**	ND	ND	ND	ND	2.3	NA
Zinc	690*	45	150*	160*	370*	95	86
Other Inorganic Substances							
Total Cyanide	3,640**	ND	ND	ND	ND	1.0	1.0
Volatiles							
Benzene	7,270**	ND	ND	ND	ND	5,100[a]	700[a]
Chlorobenzene	6,520*	630*	12.2	8.3	ND	160[a]	129[a]
Chloroethane	2,420	ND	ND	ND	ND	NA	NA
Chloroform	614,000	28,600	ND	3.6	ND	NA	NA
1,2-Dichloroethane	396,000*	11,200	15.3	13.7	ND	113,000	NA
Ethyl benzene	3,900*	ND	ND	ND	ND	430[a]	NA
Methylene chloride	200,000	2,140	17.0	12.1	10.6	NA	NA
Methylethyl ketone	2,000,000	ND	49.2	45.4	75.0	NA	NA
Tetrachloroethylene	24,500	10,600	ND	ND	ND	NA	NA
Trichloroethylene	161,000**	34,500**	ND	3.8	ND	2,000[a]	NA
1,1,1-trichloroethane	81,200	3,450	5.5	12.9	5.4	NA	NA
Toluene	90,000**	10	48.1	20.6	ND	6,300[a]	5,000[a]
Total xylene	35,600	ND	20.7	ND	ND	NA	NA
Vinyl chloride	7,290	ND	ND	ND	ND	NA	NA
Semi-volatiles							
Nitrobenzene	57,900*	23.3	ND	ND	ND	6,680[a]	NA
Total Phenols	42,500*	ND	133	ND	ND	5,800[b]	NA
Other Organic Compounds							
Petroleum hydrocarbons	2,270,000	1,300	ND	ND	ND	NA	NA

1 Downstream data includes two stations
* Elevated above AWQC chronic levels or LOEL
** Elevated ≥ 10 times AWQC chronic levels or LOEL
a Lowest observed effects level
b Lowest observed effects level for phenol
ND Not detected
NA Data not available

A number of VOCs were detected in on-site soils (Table 1). For example, ethylbenzene, tetrachloroethylene, and xylene were detected at high concentrations in on-site soils and their concentrations in the sediment of Peach Island Creek adjacent to the site exceeded their highest respective AET values by at least an order of magnitude. Toluene and trichloroethylene also were found at high concentrations in on-site soils and in Peach Island Creek sediment adjacent to the site. Most of the VOCs detected in the sediment samples had their highest concentration at the station adjacent to the site.

Numerous VOCs were detected in the shallow groundwater, and several were found at concentrations greater than 10 times their AWQC or lowest observed effect levels (Table 2). None of the VOCs in surface water samples from Peach Island Creek were detected at concentrations exceeding AWQC or lowest observed effect levels, although criteria are not available for all of the VOCs detected.

VOCs appear to have migrated from the upper water table aquifer to the lower aquifer and into the surface waters of Peach Island Creek (Dames and Moore 1988).

Semi-volatiles

Semi-volatile organic compounds detected on-site included PAHs, phthalates and phenols (Tables 1 and 2). PAHs and phthalates are persistent, tend to sorb to particulates and sediments, are toxic at moderate concentrations, and can bioaccumulate in aquatic organisms (Clement 1985).

Semi-volatiles were detected in all the major media sampled at the SCP site (Table 1). Several PAHs and phthalates were found at high concentrations in on-site soil. Bis(2-ethyl hexyl) phthalate and butyl benzyl phthalate were more than 10 times their respective AET values in Peach Island Creek sediment adjacent to the site. Napthalene and total phenols were also elevated in sediment adjacent to the site. Nitrobenzene and total phenols were detected in the shallow aquifer at elevated concentrations, but only low concentrations of total phenols were found in the surface water samples.

Other

High concentrations of petroleum hydrocarbons were observed in soil on-site, groundwater (particularly the shallow aquifer), and sediment in Peach Island Creek. Concentrations in the Peach Island Creek sediment were highest adjacent to and upstream of the site. Petroleum usually consists of a large fraction of aliphatic hydrocarbons, which are of relatively low toxicity, as well as variable levels of aromatic and heterocyclic compounds. Little is known about the toxicity of many of the individual hydrocarbons in petroleum products, but overall toxicity will depend on the specific chemical composition of the petroleum hydrocarbons present.

TRUST HABITATS AND SPECIES IN SITE VICINITY

Habitats and Species

The NOAA trust habitats of concern at the SCP site include Peach Island Creek, Berrys Creek, the Hackensack River, and the Hackensack Meadowland wetlands surrounding the area. Peach Island Creek, adjacent to the site, is a small tidal stream approximately ten meters wide, 0.5-1.0 meters deep, and with an organic silt substrate. Salinity levels in the stream average 4.2 parts per thousand. The stream has been physically modified by the disposal of debris and dredged materials, and has an embankment across the stream just downstream of the SCP site. Culverts in the embankment permit the flow of water between the upper and lower reaches. Berrys Creek is also a tidally influenced mid-salinity stream, and water quality is considered degraded due to contaminants in the watershed (Byrne, personal communication 1989).

There is little information on the use of Peach Island Creek by trust species. Killifish (*Fundulus* sp.) are known to inhabit the creek adjacent to the site (D. Ludwig, personal communication 1989). Berrys Creek has a number of euryhaline, anadromous, and catadromous species, including grass shrimp, blue crab, killifish, white perch and American eel. While these species are known to occur in the lower reaches of Berrys Creek near the beginning of the canal, it is not known whether they use the upper reaches of Berrys Creek and Peach Island Creek. Dissolved oxygen in both creeks is naturally low during the summer months, causing species to move downstream towards the Hackensack River (Dames and Moore 1988). The Hackensack Meadows Development Commission has recently conducted a resource study in the area, but the report is not yet available (D. Smith, personal communication 1989).

The Hackensack River is known to harbor many estuarine and anadromous species and is an important nursery area. (Beccasio et al. 1981) (Table 3). American shad, designated a threatened species by the State of New Jersey, are found in the Hackensack River. Other anadromous species that may use the lower salinity habitats of the Hackensack River include blueback herring, alewife, white perch, and striped bass. Blueback herring and alewife spawn in the Hackensack River (Zich 1977), but spawning grounds are reported to be limited due to the Oradell dam on the Hackensack River, 20 km upstream of the mouth of Berrys Creek (USFWS 1983). There are no commercial fisheries on the Hackensack River system, and a New Jersey Department of Public Health advisory is in effect for recreational fishing for all the major species, due to contaminants in the watershed (Byrne, personal communication 1989).

Contaminants in Habitats and Species

PCBs, trace elements and VOCs were found in the sediment of Peach Island Creek at potentially toxic concentrations. Trace elements (copper, chromium, mercury, nickel, and zinc) were present in the surface water of Peach Island Creek at concentrations exceeding AWQC for the protection of saltwater aquatic organisms. No bioassessment or bioaccumulation investigations were conducted as part of the SCP on-site Remedial Investigation to determine the potential toxicity or availability of the contaminants present to biota in Peach Island or Berrys Creek, although studies will be conducted in Peach Island Creek under off-site investigations (D. Ludwig, personal communication 1989).

Table 3. Habitat use and recreational importance of important invertebrate and fish species present in Berrys Creek and the Hackensack River in the vicinity of the mouth of Berrys Creek (Zich 1977; Beccasio et al. 1981).

Species	Spawning Area	Nursery Area	Adult Habitat	Migration Route	Recreational Fishing
<u>Berrys Creek</u>					
American eel		x	x		
Blue crab		x	x		
Grass shrimp		x			
Killifish	x	x	x		
White perch	x	x	x		
<u>Hackensack River</u>					
Alewife	x	x	x	x	x
American eel		x	x		
American shad				x	x
Atlantic croaker		x			x
Atlantic menhaden		x			x
Bay anchovy		x	x		x
Blue crab		x	x		
Bluefish		x			
Blueback herring	x	x	x	x	
Killifish	x	x	x		
Striped bass		x	x	x	
Spot		x			x
Summer flounder		x			x
Weakfish		x			x
White perch	x	x	x	x	

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U.S. EPA. 1980g. Ambient water quality criteria for arsenic. Washington, D.C.: U.S. Environmental Protection Agency, Office of Water Regulation and Standards, Criteria and Standards Division. EPA 440/5-80-054.

U.S. EPA. 1980h. Ambient water quality criteria for nickel. Washington, D.C.: U.S. Environmental Protection Agency, Office of Water Regulation and Standards, Criteria and Standards Division. EPA 440/5-80-60.

U.S. EPA. 1983. Hazardous waste land treatment. Washington, D.C.: U.S. Environmental Protection Agency, Office of Water Regulation and Standards, Criteria and Standards Division. SW-874.

APPENDIX B

LOCATIONS FOR INFORMATION REPOSITORY AND PUBLIC MEETING

Information Repository

William E. Dermody Free Public Library
420 Hackensack Street
Carlstadt, New Jersey 07072
(201) 438-8866

Meeting Location

Carlstadt Borough Hall
500 Madison Street
Carlstadt, New Jersey 07072
(201) 939-2850

U.S. EPA. 1984a. Ambient water quality criteria for copper. Washington, D.C.: U.S. Environmental Protection Agency, Office of Water Regulation and Standards, Criteria and Standards Division. EPA 440/5-84-031.

U.S. EPA. 1984b. Ambient water quality criteria for chromium. Washington, D.C.: U.S. Environmental Protection Agency, Office of Water Regulation and Standards, Criteria and Standards Division. EPA 440/5-84-029.

U.S. EPA. 1986. Quality criteria for water. Washington, D.C.: U.S. Environmental Protection Agency, Office of Water Regulation and Standards, Criteria and Standards Division. EPA 440/5-86-001.

U.S. Fish and Wildlife Service (USFWS). 1983. Fish and wildlife resources inventory and evaluation for the interim survey level flood control study (stage II) in the Hackensack River Basin, Hudson and Bergen Counties, NJ. U.S. Department of the Interior.

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